A DETERMINATION OF GENETIC CONTROL FOR THE THIGMOTROPIC LEAF REACTION IN *DIONAEA MUSCIPULA*

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The Venus' flytrap (**KINGDOM**-Plant, **PHYLUM**-Magnoliophyta (Angiosperm), **CLASS**-Magnoliopsida, **ORDER**-Sarraceniales, **FAMILY**-*Droseraceae*, **GENUS**-*Dionaea*, and **SPECIES**-*muscipula)* is a fascinating plant that has adapted to the nitrogen poor soil of bogs along the coastal areas of North and South Carolina. The Venus' flytrap has developed highly specialized leaves consisting of two lobes hinged at a midrib. When triggered the lobes close to catch insects and small animals that supply necessary nitrogen. These leaves can be closed when two of three trigger hairs, situated on the inner portion of the lobes, are stimulated within thirty seconds of each other.

Each trap has the ability to be triggered a certain number of times before it withers and dies. No two resources concur on the number of times each leaf can open and close before it is rendered useless. Is the number of times a leaf opens and closes before it withers a genetic trait? A procedure to test this point was developed.

The first step was to clone (make exact genetic duplicates) four "mother" plants into eighty daughter plants. Then, by testing the reaction of the clones, it would be possible to see if this trait is genetically controlled. How would this work? If all of the clones from one "mother" plant opened and closed the same number of times before withering, the trait can be concluded to be genetically controlled. A second possibility would be that all Venus' flytraps react the same number of times. This would again infer genetic control. Another option would be that this process was randomly determined.

The cloning process must be done in a sterile area because any contamination would surely kill the plants. To create this sterile area, a fish tank was placed on its side, and coated with isopropyl alcohol. The mother plants were placed in this sterile area, and separated in such a way that each clone had a bulb (enlarged base of the petiole) and a portion of the black roots. To separate these plants, sterile instruments were used. When the plants were successfully separated, each plant was either placed in air-tight sterile test tubes containing multiplication medium or rooting medium. The test tubes containing the clones were labeled according to their mother.

Careful records of the plants' growth and maturity levels were kept. Data included: the size of the plants, the size of their roots, and whether the plants' leaves were open or closed. After a period of about seven months, the plants were transplanted into soil. Plants were then removed from the safety of their sterile test tubes, and exposed to the soil of the outside world. The environment set up for each plant consisted of two clear plastic cups. One of these cups sat filled with soil, while the other gently rested inverted on top. This allowed the exchange of air, while retaining moisture. Each plant was placed equidistant from a flourescent light bulb, where they grew without interference for a period of two weeks. To assure the validity of the experiment all conditions were carefully monitored and kept identical for each plant.

The amount of times each leaf opened and closed before it dies was tested. Traps were stimulated at regular intervals under carefully monitored conditions. The number of times each trap opened and closed was recorded until the death of the leaf. This process took place over a period of four months. Schematic diagrams were kept and computers were utilized to assist the analysis of data.

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The data followed what appeared to be a general pattern. All of the daughter plants from one parent did not have the same number of reactions. Different plants, and in many cases even different leaves of the same plant had different numbers of reactions. The number of times different leaves opened and closed ranged from one time to ten times. But, for most of the plants, the reaction for the leaves on the same plant was within two or three of each other. This pattern demonstrates that stimulus reponse limitation may be a genetic trait. In order to prove whether the number of times the traps of the Venus' flytrap open and close before withering and dying is genetically controlled, further data will be needed.

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Eighty test tubes are arranged equidistant from a flourescent light.

Close-up of a Venus' flytrap. Note three trigger hairs on rear lobe. Photo by Bob Hanrahan.